UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Fisheries Science Center
Fish Ecology Division
2725 Montlake Boulevard East
Seattle, Washington 98112-2097

July 21, 2006

MEMORANDUM FOR: F/NWR3 - Gary Rule

FROM: F/NWC3 (for) John W. Ferguson

SUBJECT: Application for Endangered Species Act Section 10 Research Permit

Attached is an Endangered Species Act Section 10 research permit application for the project: "Juvenile Chinook Salmon Use of the Nearshore Habitats of Northern Puget Sound and the Whidbey Basin". The principal investigator is Kurt L. Fresh, with the National Marine Fisheries Service, Northwest Fisheries Science Center.

If you have any questions concerning the application, please contact Kinsey Frick at (206) 860-5619.

Attachments

cc: F/NWC3 - Fresh
F/NWC3 - Frick
F/NWC3 - Gores

A. Title

Application for Permit for Scientific Purposes under the Endangered Species Act of 1973.

Study Title: "Juvenile Chinook Salmon Use of the Nearshore Habitats of Northern Puget Sound and the Whidbey Basin"

B. Species

Chinook salmon, *Oncorhynchus tshawytscha*	Puget Sound ESU
Chum salmon, *Oncorhynchus keta*	Puget Sound ESU

C. Date of Permit Application

July 20, 2006
Study duration: 2007 – 2011 (5 years)

D. Applicant Identity

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E. Information on Personnel, Cooperators, and Sponsors
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USGS: Reg Reisenbichler, Kim Larsen, Angie Lind-Null, Nancy Elder, Jeff Duda
NWIFC: Will Beattie
SRSC Tribe: Rich Henderson, Eric Beamer
Tulalip Tribe: Robert Skoog, Todd Zackey, Ross Fenton
WDFW: Anne Shafer
Lower Elwha Tribe: Larry Ward, Mike McHenry
Jamestown S'Klallam: Dave Shrefler
University of Washington: Tom Quinn
Washington Trout: Micah Wait
Battelle Research Labs Northwest/Oregon State Univ.: Nikki Sather
Self Employed: Tina Wylie-Echeverria

Funding Sources/Sponsors

The research covered under this permit is a collaborative effort among state, federal, local governments, and tribal entities. It is a blend of continuing research (e.g., Skagit Bay townetting- currently covered under Permit #1140) and proposed new work (e.g., studies related to the Elwha Dam removal and the Dungeness River estuary). All involved organizations provide some level of in kind support to this program in the way of personnel, boats, and other equipment; we expect this support to continue. The primary source of funding support for this project at this time is internal funding from the Northwest Fisheries Science Center. Other funding sources include the Intensively Monitored Watershed Program which provides support for work in the Whidbey Basin Area. The NWFSC and some of its collaborators involved in this proposed research intend to submit directed proposals to fund portions of this work, such as genetic analyses and otolith microstructure analyses.

Internal Northwest Fisheries Science Center Funding (secured)
Contact: John W. Ferguson
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Intensively Monitored Watersheds Program (secured)
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F. Disposition of dead specimens (tissues)

Specimens that are intentionally sacrificed (accidental mortalities are also incorporated into this number) collected during field operations are labeled and placed in a plastic bag, then brought to the Northwest Fisheries Science Center and immediately frozen. Specimens are thawed, weighed and measured; body tissues and otoliths, scales, kidney, fin clip, stomach, and any CWT (Coded Wire Tags) or PIT (Passive Integrated Transponder) tags are removed and preserved. Remaining body tissues are archived.

Otoliths will be transferred to:
Kim Larsen
USGS, Western Fisheries Research Center
6505 NE 65th Street
Seattle, Washington 98115
Phone: (206) 526-6282; Fax: (206) 526-6654

Genetic samples will be transferred to:
Paul Moran, NOAA Conservation Genetics Lab
NOAA Fisheries, Northwest Fisheries Science Center
Conservation Biology Division
2725 Montlake Boulevard East
Seattle Washington 98112-2097
206-860-3245
Paul.Moran@noaa.gov

All other samples and specimens are analyzed by research scientists within the National Marine Fisheries Service and/or archived at the Northwest Fisheries Science Center for

use by previously listed Center researchers and their collaborators. For information on archived samples, contact:

Anna Kagley, Fishery Biologist
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G. Project Description, Purpose, and Significance

Healthy salmon populations depend upon use of the full range of habitats available to them throughout their entire life cycle (Bottom et al. 2005b). Nearshore habitats (defined as the network of shoreline habitats extending seaward from the upper intertidal to the outer extent of the photic zone; in Puget Sound, this corresponds to a depth of about 70-80 ft) are occupied by juvenile salmon during their transition from freshwater spawning and rearing habitats to ocean feeding grounds. Emerging research demonstrates that nearshore habitat characteristics and the period of nearshore residence are critical to the viability and persistence of salmon populations, and can directly affect population productivity and abundance of returning adults (Mortensen et al. 2000; Magnusson and Hilborn 2003; Beamer et al. 2005; Greene and Beechie 2004; Greene et al. 2005; Bottom et al. 2005a). It has become clear that the protection and restoration of nearshore habitats is essential to recovery of depressed salmon populations (Kareiva et al 2000; Mortensen et al. 2000; Greene and Beechie 2004; Bottom et al. 2005a).

The primary objective of this research is to characterize how wild, juvenile Puget Sound Chinook salmon use nearshore habitats in Whidbey Basin and Northern Puget Sound (NPS). For purposes of our study, NPS consists of three geographic areas: Admiralty Inlet, Strait of Juan de Fuca, and San Juan Islands. Specifically, our goals are to define what populations and life history strategies are present in this area, their residence time, their distribution, timing of movements, diet, health, age, and origin. In addition, we will examine how use varies with characteristics of these habitats, such as location of the habitat, quality of habitat, quantity of habitat, and when fish are present.

We are proposing to study the NPS region because we know less about juvenile Chinook salmon use of this area than other areas of Puget Sound. Further, this region likely functions as an important mixed stock rearing and migration area since all Puget Sound Chinook salmon populations potentially must pass through NPS during their migrations to ocean feeding grounds. Our reason for studying the nearshore areas of Whidbey Basin is that 10 of the 22 wild populations in the Puget Sound Chinook salmon ESU spawn in waters draining into Whidbey Basin, so it is a key part of

recovery of this ESU. Also, the Whidbey Basin has been the focus of a great deal of ongoing research on use of estuary and nearshore habitats by juvenile Chinook salmon. This proposed project would allow us to continue some ongoing work as well as extend sampling into new habitats and areas not being covered by existing work. For example, the project "Juvenile Chinook Salmon Use of the Snohomish River Estuary" (permit application has been submitted) involves work only in the Snohomish estuary/delta. With this new project, we will extend the estuary work into Whidbey Basin to understand what happens to the fish after they leave the Snohomish estuary.

The primary purpose of this project is to gain knowledge of the ecology and origin of wild, listed, Puget Sound Chinook salmon to support recovery efforts for this species. Therefore, wild, listed, juvenile Chinook salmon is the only species appropriate for this proposed work. There are enough differences in basic life history and ecology between Chinook salmon and other species of salmon that no other species would serve as an adequate surrogate. Further, since wild and hatchery Chinook salmon differ from each other (as well as other salmonids) in terms of their population structure, habitat use, and so on, hatchery-origin fish are not an adequate surrogate. Although naturally-produced juvenile Chinook salmon are the primary focus for this study, we will also obtain matching information on use of nearshore habitats by artificially-propagated juvenile Chinook salmon (including listed stocks) for comparison.

Information generated by this research will help to develop protection and restoration strategies and actions for Chinook salmon in the Puget Sound ESU and help monitor the effects of recovery actions on listed populations. In addition, information obtained from this research is needed to help evaluate the effects of urbanization (e.g., alterations to shoreline habitats) on Chinook salmon in Puget Sound. This research will also provide knowledge about the salmon response to the federally mandated removal of the Elwha River dams by allowing us to track changes in distribution, abundance and habitat use of listed juvenile Chinook salmon in the Strait of Juan de Fuca before and after the dams are removed.

This proposed research is directly related to the NWFSC Salmon Science Plan (e.g., Brodeur et al. 2000), the recently developed draft Shared Salmon Strategy Salmon Recovery Plan (see www.sharedsalmonstrategy.org/plan/), and several other authoritative sources including the NMFS Northwest Regional Office's responsibility to develop and implement recovery plans for listed species in Puget Sound. For example, the recently developed Shared Salmon Strategy (2005- draft recovery plan, www.sharedsalmonstrategy.org/plan/) concluded that protection and restoration of nearshore ecosystems was a key part of recovery of Chinook salmon populations in the Puget Sound ESU, and identified the lack of knowledge of nearshore habitat use by juvenile Chinook salmon as a major impediment to the development of recovery strategies for this species. Brodeur et al. (2000) reported that "despite previous research efforts, we still have an incomplete understanding of distribution and ecology of juvenile salmon in nearshore and coastal environments." The Salmon Science plan

for the Northwest Fisheries Science Center advocates a comparative approach between various estuarine systems and also advocates gathering information to determine if hatchery and wild salmonids partition their use of estuarine and oceanic habitats in fundamentally different ways. Thus, the research we have proposed is intended to supplement and complement proposed and ongoing research being conducted in other areas of Puget Sound and the Pacific Northwest.

H. Project Methodology

Overall Approach.

Within the Whidbey Basin and NPS we will sample two major nearshore habitat zones. The first zone is the littoral zone, which we define as the intertidal and shallow subtidal area within about 100ft of shore. It includes an array of different habitat types such as lagoons, small estuaries, beaches, and eelgrass beds. The second zone is the nearshore pelagic zone, which encompasses the surface waters 0-20 ft deep extending from the outer edge of the littoral zone offshore to a depth of about 70 ft. Methods that will be used to sample each of these two zones have been developed specifically to study young salmon in these habitats and have a long history of use in this region (Miller et al. 1977; Fresh 1979; Fresh et al. 1979; Simenstad et al. 1991; Duffy 2003).

We have structured our research to focus on the littoral and nearshore pelagic zones because previous work throughout the Pacific Northwest has demonstrated that these are the two most important zones within the nearshore used by juvenile salmon (Stober and Salo 1973**;** Miller et al. 1977; Fresh et al. 1979). In addition, juvenile salmon appear to use habitats within these two zones differently. For example, studies in other parts of Puget Sound have demonstrated that juvenile salmon move from shallow to deeper habitats as the fish increase in size and as time of year changes (Duffy 2003). Diet and growth can be different in these two habitats as well (Duffy 2003). Thus, sampling both habitats is necessary in order to fully understand nearshore habitat use.

Field Sampling Methods.

Littoral Habitats. The primary method of capturing juvenile Chinook salmon in the littoral habitats of NPS and Whidbey Basin will be with beach seines, which have been used for many years to juvenile salmon in this region (Miller et al. 1978; Fresh et al. 1979; Simenstad et al. 1991; Duffy 2003; Brennan et al. 2004). There are three types of beach seines that we will use. The use of any one of these nets to sample at a site will depend on the specific type of habitat being sampled, time of year, and other factors (i.e. wind). One seine that was developed for work in Puget Sound (Simenstad et al. 1991) is 3 m deep and 37 m long with two, 11 m wings of 9 mm stretch mesh, and a 1.1 m center bag section with 3 mm of stretch mesh. The net is typically deployed parallel to shore at a distance of 30 m from the shore. The second seine is 120 ft long, 12 ft deep in the middle, and has 1/8” mesh; it was developed by the Skagit River

System Cooperative Tribe (Beamer et al. 2005). The third seine is 80ft long x 3 ft deep, 1/8" knotless mesh seine (Beamer et al. 2005).

Nearshore Pelgaic Habitats. There are a number of methods that we will use to sample nearshore pelagic habitats. The use of any one method will depend upon such factors as location within our study area, shoreline conditions, prevailing weather and currents, vegetation conditions, size class of fish we are targeting, and time of year samples are to be collected. The primary method of capture in these habitats will be surface trawl nets (also referred to as "townets"). This method has been used since the mid 1970s to study the life history and ecology of juvenile salmon in Puget Sound (Fresh 1979; Fresh et al. 1979; Duffy 2003). The net has a 3.1 m x 6.1 m opening with variable mesh sizes ranging from 76 mm at the opening to 6.4 mm at the cod end. The net is towed between two boats along the surface, generally for a period of about 10 minutes before it is retrieved and the catch is processed. Tows can be made during either day or night.

In addition to townets, we will use purse seines and lampera nets. One of the purse seines we expect to use is a shallow-water seine constructed of knotless nylon mesh 17 mm in the body and 13 mm in the bundt (100 m x 4.6 m). A 10 mm mesh liner was inserted in the cod end of the trawl to ensure retention of small fishes. A round-haul technique is used to deploy the net. We have two additional nets measuring 750 ft long and 1500 ft long. Both nets have small meshes and are designed to target juvenile life stages of salmon and other species such as forage fish.

The lampera net is similar in relative proportions to a purse seine except there is no purse line. The lampera net we propose to use is 300 ft long and 30 ft deep in the middle, with mesh sizes grading from 2 inches to 0.25 inch. It requires two boats to set and retrieve the net. The net is fished similar to a purse seine in that it can be towed, held open into the current for a period, or set using a round haul method.

Sampling Regions. Our proposed research is structured around sampling four geographic regions: Whidbey Basin, Admiralty Inlet, Strait of Juan de Fuca, and the San Juan Islands. The following represents the geographic boundaries of each of these regions:

a. Whidbey Basin. This area is bounded to the North by Deception Pass and to the south by Possession Point on Whidbey Island. Whidbey Basin also includes Padilla Bay and Swinomish Sloughs to the north because of their historic connection with Skagit Bay.

b. Admiralty Inlet. This area represents the entrance to the main Puget Sound Basin. It is bounded to the south by the entrance to the Hood Canal and a line extending east from Point No Point to Possession Point. It includes both the east and west shores in this region.

c. San Juan Islands. This area includes the nearshore habitats of the U.S. Territorial Waters of the San Juan Archipelago. The eastern boundary is the center line of Rosario Strait as defined by the U.S. Coast Guard shipping lane.

d. Strait of Juan de Fuca. This area is bounded to the west by Pillar Pt. and to the east by Admiralty Inlet and includes both Discovery and Sequim bays. It also includes the west side of Whidbey Island from Admiralty Head to Deception Pass.

Sampling Methods and Frequency Used in Each Region. Our objective is to sample each region for a period of 5 years beginning in 2007. The specific sampling methods and frequency used in each region will depend upon such factors as availability of particular habitat types, size of the area, logistical issues, how many fish we are catching, and conditions (high vs. low wave energy). A major factor we have considered is ongoing and proposed work by other investigators in each region. We have structured our sampling program to avoid duplication with these other programs. As a result, there are some areas where we will not use a particular sampling approach or we will sample specific areas not being covered by these other investigators. For example, the SRSC Tribe is currently beach seining in Skagit Bay, which is the northern extent of Whidbey Basin. As a result, our beach seine sampling in Whidbey Basin will be limited to areas they do not sample (e.g., Saratoga Passage). For each region, we have developed a proposed take goal for each habitat zone (nearshore pelagic vs. littoral) based upon our projected, **maximum** level of effort, sampling methods to be employed, and projected catch.

Catch Processing. We will use the same methods that have been developed from many years of experience to rapidly process our catches regardless of the method of capture so as to minimize stress and mortality of fish. By following these protocols, mortality of fish due to capture and handling will be negligible. All project personnel are very experienced in fish handling techniques and in the ability to identify stress and reduce it before lethal effects occur.

After capture, fish will be held either in live-wells with aeration and flow through water, in mesh pens at the site of capture, in aerated buckets, or in the bag of the net before being processed. In all cases, the method that minimizes stress to the fish, is appropriate to the location, and is appropriate to the study objectives will be used. The catch is separated into salmonid and non-salmonid portions and the non-salmonid portion is identified to species, counted, and released; some non-salmonids, such as juvenile forage fish species (e.g., herring), may also be measured for length.

All salmonids that are not Chinook salmon are then counted and released. Depending on conditions, size of catch, size of fish to be handled, and other factors, we may chose to anesthetize these fish with a non-lethal dose of MS-222 (size-dependent, not to exceed 1g/5gal water) for ease of handling. We will typically measure the length of up

to 25 of each non-Chinook salmon species (fork length). As time permits, weights of some individuals of these species (e.g., coho salmon) are also obtained.

For the Chinook salmon portion of the catch, the previously mentioned non-lethal dosage of MS-222 may be used to reduce injury and stress to fish during handling. Fish will be allowed to fully recover from the anesthetic before being released. All juvenile Chinook salmon are routinely examined for the presence of external marks such as a missing adipose fin and wanded to determine if they have a coded-wire tag (CWT) and then placed into one of three groups for processing purposes.

First, hatchery and wild fish that are needed for intentional lethal take will be identified and then sacrificed. For the beach seining and townetting, we have established annual goals for lethal take that are spread out over space and time. Fish designated for lethal take will always include any fish that appears to be stressed, appears likely to die, or are already dead at the time of capture. Fish that are sacrificed are frozen, placed in bags, and taken to the laboratory for additional processing.

Second, up to an additional 25 juvenile Chinook salmon per type (hatchery vs. wild) per haul per site per date will be measured for length and weighed. Some of these fish will have a very small portion of their dorsal or caudal fin removed in the field and placed in alcohol for subsequent genetic sampling. These fish will be released after full recovery. In each of the four areas, we will clip the fins of up to 200 wild Chinook salmon juveniles and 100 hatchery origin Chinook salmon each year of the study. Third, any remaining fish will be examined for any marks, wanded (to determine if the fish has a CWT), counted, and then released after full recovery.

Occasionally, during purse seining and lampera net sampling that occurs in the fall and spring, some juvenile Chinook salmon will be selected for tagging with an acoustic transmitter. The goal of the acoustic tagging work is to study the use of nearshore habitats by resident Chinook salmon (also termed blackmouth). Resident salmon are those Chinook salmon that do not migrate to sea as most other salmon do, but rear for all or a portion of their lives in Puget Sound (and potentially other areas such as the Strait of Georgia). Because of the large size of these fish and the fact that they generally occur rarely in the sampling gears we will be using, we believe using acoustic transmitters will improve our ability to study nearshore use of fish that adopt this life history strategy.

The fish that are selected for tagging with an acoustic transmitter will range in size from about 200 to 500 mm. Fish selected for tagging will be anesthetized, measured, and weighed. An acoustic transmitter will be inserted into the abdominal cavity of the fish using surgical techniques. After recovery, the fish will be released into the area where it was captured. Detections from receivers located throughout Puget Sound will be used to study movements and habitat use, focusing on use of nearshore areas, of the blackmouth.

Identification of Chinook Salmon. Within the Whidbey Basin and NPS, we will be capturing a mix of listed wild, unlisted wild (i.e., Canadian origin), listed hatchery fish, and unlisted hatchery fish. Hatchery fish can be identified by the presence of external marks such as a missing adipose clip or by the presence of an internal CWT. Some hatchery fish have both a CWT and external mark, some a CWT only with no external identifier, and some a missing adipose fin with no CWT. As a result, all fish that we handle are always examined for the presence of an external mark such as a missing adipose fin. In addition, all fish will be wanded to determine if they have a CWT. At this time, there are not yet enough fish released into Puget Sound with PIT tags to warrant using a PIT tag detector.

Laboratory Processing

In the field, the carcasses of all sacrificed fish will be frozen and saved in plastic bags, while any fin clips taken in the field will be saved in vials with alcohol. We will store all juvenile salmon carcasses that are collected for further processing. From all sacrificed fish, we will obtain a CWT (if present), otoliths and scales for life history information, stomach contents for diet information, blood and kidney for disease screening, and fin clips for genetics.

I. Description and Estimates of Take

Our sampling plan specifically targets wild juvenile Chinook salmon (*Oncorhynchus tshawytscha*) from the Puget Sound Chinook salmon ESU, but any catch can potentially be a mix of hatchery and wild fish. The hatchery component of our catches could be either listed or unlisted fish, while the wild component could also be listed or unlisted (e.g., Canadian) fish. Although there is data available that allows us to develop predictions of the hatchery:wild proportions we will encounter, we cannot predict the proportion of listed hatchery, non-listed hatchery, listed wild, and unlisted wild Chinook salmon in any area and at any time. Determining these proportions is a major goal of our study. These proportions will depend upon numbers of hatchery fish released each year and the marking rate and type of marks by hatchery. For example, any one Puget Sound hatchery can release a mix of listed fish that are CWT tagged with adipose fin intact, CWT tagged with adipose fin removed, or the adipose fin removed with no CWT.

Therefore, to calculate take, we conservatively assumed that all juvenile Chinook salmon not identified as hatchery origin were wild fish, and we assumed that all hatchery fish we catch are listed hatchery fish. We have divided the listed hatchery Chinook salmon catch into two categories: Adipose Fin Removed (both with and without CWT) and Intact Adipose Fin (with CWT). Post catch processing (e.g., DNA analyses, examination of otoliths) will allow us to eventually develop estimates of the proportions of each type of fish, but this cannot be done in a timely fashion for annual

reporting (i.e., the catch composition from any one year will take longer than one year to determine) and will depend upon funding. As the data becomes available we will provide estimates of proportions of the number and types of fish that we handle.

Additionally, although we are **not** targeting listed chum salmon (*Oncorhynchus keta*), we expect to encounter some listed chum salmon (in low numbers) in our sampling efforts due to their migratory overlap with Chinook salmon. This will only occur in the Strait of Juan de Fuca and Admiralty Inlet regions. Chum salmon take listed in the tables represents this incidental take.

1. **Chinook salmon**

   A recovery plan for the Puget Sound Chinook salmon ESU was recently published (www.sharedsalmonstrategy.org/plan/index.html). A summary of the most recent information evaluating the status and trends of Chinook salmon in this ESU is provided in Chapter 2 of this plan (see Figure 2.8, page 48) while greater details can be obtained in chapters for individual watersheds. Overall, existing levels of abundance of most Puget Sound Chinook salmon populations are no better than historic levels and in some cases as low as 1% of historic levels.

   Our estimated annual take for Chinook salmon is presented for each region in Tables 1 to 4 and summarized for all areas in Table 5. We have computed and reported take estimates separately for three categories of fish: listed hatchery Chinook salmon (Adipose Fin Removed with or without CWT), listed hatchery Chinook salmon (Intact Adipose Fin with a CWT), and listed wild Chinook salmon. Our method of calculating take varied with the method of sampling and by region.

   We calculated projected take for each region (rather than for individual sites within a region) and we have established lethal take (i.e. intentional mortality) goals for each region. Total take (lethal and non-lethal) was estimated based upon the **maximum** total number of hauls or sets we project to make each year in an area by gear type and projected catch per haul or set. We used beach seine and townet data from Whidbey Basin to compute average catches by gear type for both hatchery and wild fish. We then multiplied these catch per set or haul values by the total number of hauls to derive total take of hatchery and wild fish. In applying data from Whidbey Basin to other areas, we adjusted catches in other areas to half the values for Whidbey Basin because by the time fish enter NPS, their abundance will be reduced (e.g., due to predation) and they will be less concentrated than they are in Whidbey Basin.

   In Whidbey Basin, wild fish are more abundant than hatchery fish (Beamer et al. 2005). Therefore, we reversed the hatchery and wild catch values in

areas outside Whidbey Basin because we expected catches in these other regions to consist of proportionately more hatchery fish (Brennan et al. 2004).

For the listed hatchery fish component (which we assume to be all hatchery fish we catch), we estimated the proportion of the Chinook salmon with that are ad-clipped (with or without CWT) and with Intact Adipose Fin (with CWT). For the ad-clipped (with or without CWT) category we used a value of 95% and for Intact Adipose Fin (with CWT) we used a value of 5%. We based these estimates upon data from studies in Central Puget Sound by Brennan et al. (2004), in Central Puget Sound (Fresh,unpublished data), in Sinclair Inlet (Fresh, unpublished data), and in the Straits of Juan de Fuca (Fresh unpublished data). In general, the greatest number of hatchery Chinook salmon released into Puget Sound with CWTs has historically been 10% when the "10% Program" was conducted in the 1980's by WDFW. Also, since the listing of Puget Sound Chinook salmon, fishery management agencies and tribal entities have adipose clipped (or attempted to) most of the Chinook salmon juveniles released into Puget Sound each year. The actual proportion of the juvenile Chinook salmon released into Puget Sound that have their adipose fins removed varies between hatcheries and between years.

Sample size goals for intentional mortalities were established for each area for hatchery and wild fish. Our focus of lethal take for the hatchery fish component will be on fish with Coded Wire Tags in order to determine their origin. Fish designated for intentional mortality were subtracted from the total projected catch and the remainder were considered to fall in the other categories.

2. **Chum salmon, summer run**.
A recovery plan for the Hood Canal summer chum salmon ESU was recently published (www.sharedsalmonstrategy.org/plan/index.html). A summary of the most recent information evaluating the status of summer chum salmon in this ESU is provided in Chapter 2 (Chapter 2, Figure 2.12) of this plan while greater details can be obtained in chapters for individual watersheds, especially the Hood Canal, Dungeness, and Elwha chapters. Overall, all but of one of these (Big/Little Quilcene) populations are at such low abundance levels that the risk of extinction is high. Several of these populations have annual escapements of < 15 spawners. In addition, 6 of the 8 populations are exhibiting decreasing long term trends in abundance with returns below replacement levels.

Listed summer chum salmon juveniles may be incidentally encountered. The only two areas where we expect to encounter summer run chum salmon

in the types of gears we are using is in Admiralty Inlet and the Straits of Juan de Fuca. Numbers of fish in the summer chum populations are so low that we believe the encounter rate of summer chum salmon will be very low. We assumed a low, non lethal take of summer run chum salmon (Table 5).

I. Relationship of this Proposed Work to Other Research and Other Collaborators

A major objective of how we conduct our research is to minimize the take of listed species. For example, we use protocols specifically designed to minimize handling mortality of juvenile Chinook salmon. An especially important way that we minimize take is to work collaboratively with other investigators to avoid unneeded duplication of take. In particular, we work continuously to be aware of other ongoing or proposed programs that are sampling listed species in NPS and Whidbey Basin. Because of the five year duration of this study, it is likely that new studies may be implemented that do not exist today. If we were to identify another study that was targeting listed species and overlapped in any way with our work (e.g., sampling some of the same sites at the same times, similar objectives), then we would work with the principal investigators of that study to reduce over all take between the two programs. We could do this in a number of ways. For example, if we discovered that both research studies were proposing to sample in the same area at the same time with similar gear types, we would work with the other investigators to be sure we have only one crew sampling that area and then share the data. In addition, if we found that both studies needed lethal take, we would coordinate with the other study to avoid duplication of lethal take in areas where our studies overlapped (e.g., if we were sampling the same areas at the same time with similar methods).

At the time of this permit application, we have identified the following ongoing and proposed studies that we are coordinating and collaborating with.

1. Admiralty Inlet Sampling, Washington Trout- Washington Trout (Project Leader = Micah Wait) has a permit to sample the West Side of Whidbey Island in 2006. We have communicated with them regarding their study and consulted with them regarding site selection and sampling protocols. The objectives of their work overlap extensively with the Admiralty Inlet portion of the research included in our application. However, at this time they have not proposed to continue their work in 2007 which is when our permit begins. If their study were to be extended in any way in this area, we would explicitly coordinate take issues with them, thus reducing overall take. One way this could occur is that we could restrict out sampling to the West Side of Admiralty Inlet (which they do not sample) and/or use methods (e.g., townets) that they are not using to sample other habitat types.

2. Skagit Bay/Whidbey Basin (Project Leader, Eric Beamer, SRSC Tribe)- The Skagit River System Cooperative Tribe has been conducting beach seining (but not townetting) in Skagit Bay (part of Whidbey Basin) for the last 12 years. This take is

included under the Tribal Research Permit (Section 9). Our proposed littoral sampling work will not geographically overlap with their work as we will be sampling parts of Whidbey Basin that they do not sample (Port Susan and Possession Sound). However, we are coordinating sampling methods and catch processing to ensure comparability of results and so that we can develop a seamless picture of Whidbey Basin, not simply a piece of it.

3. San Juan Islands (Project Leader, Dr. Tina Wyllie Echeverria)- Dr. Wyllie-Echeverria is sampling juvenile salmon in a limited area of the San Juan Islands (in the north part of Orcas Island, Waldron Island, and potentially Deer Lagoon). We have worked with her on her sampling methods to ensure continuity with our work. However, to our knowledge, they have not proposed to sample in 2007 which is when our permit would begin. If this study were to be extended, we would explicitly coordinate with them.

4. Skagit River Estuary and Skagit Bay (Project Leader, Correigh Greene, NWFSC) - The NWFSC has a permit (Permit #1524) to work in the Skagit River Estuary and Skagit Bay. The estuary work included under this permit has no overlap with our work since none of our sampling occurs within any estuary/delta regions. This permit also includes acoustic tagging of Chinook salmon smolts explicitly in Skagit Bay as well. They have proposed to use purse seines and lampera nets to collect fish, which are the same as some of the same methods we have employed. However, their goal is to tag smolt size fish and our goal is to tag blackmouth. There is no overlap in the sizes of fish that Dr. Greene proposes to tag and the fish we will tagging. In addition, Dr. Greene's work focuses only on a part of Whidbey Basin (Skagit Bay), while our study focuses on all of Whidbey Basin.

5. Straits of Juan de Fuca - Some relevant research is occurring in the Strait of Juan de Fuca where take is covered under the Tribal Research Permit (Section 9). For example, they are tagging fish with acoustic transmitters in the Elwha River and following their movements in the Straits of Juan de Fuca. We are coordinating sampling methods, catch processing, and data analyses to ensure comparability of results and that we do not duplicate their sampling efforts.

6. Puget Sound Blackmouth Studies – We are aware that the U.S. Army Corps of Engineers (USCOE) is applying for a permit to study blackmouth or resident Chinook salmon in Puget Sound. The objectives are to study movements of blackmouth throughout all of Puget Sound by tagging fish with acoustic transmitters. Thus, our study and the COE study will overlap spatially in NPS and Whidbey Basin. Our work is distinguished from their work in that we are interested in nearshore habitat use by blackmouth while the proposed COE study is broader in scope (all habitat types). The COE study will use methods to collect and tag fish that include other habitat types and other sampling methods (e.g., using angler caught fish in deep water areas, > 150 ft). However, the COE study could opt to collect fish in Whidbey Basin and NPS in

nearshore areas for their study purposes. We will coordinate any sampling in Whidbey Basin and NPS nearshore areas between the two programs so that we minimize the amount of sampling that will occur and the number of listed fish that are handled. One way we could do this is by sampling at different times of the year. For example, we could sample in fall and spring (as per our study design) while the COE would do their tagging in winter and summer.

J. Relationship of this Proposed Work to Other ESA Permits

To the best of our knowledge, the following represents ESA permits that are included within our study area:

1. Permit #1140 (NWFSC) - Some of the sampling proposed for Whidbey Basin in our permit application represents a temporal extension of ongoing work under Permit #1140. This is specifically the townetting work that began in 2002. Once the permit applied for here is granted, it will replace that portion of Permit #1140.

2. Permit #1524 (NWFSC) - The NWFSC has this permit (Permit #1524) to work in the Skagit River Estuary and Skagit Bay. The estuary work included under this permit has no overlap with our work since none of our sampling occurs within any estuary/delta regions. This permit also includes acoustic tagging of Chinook salmon smolts explicitly in Skagit Bay as well. They have proposed to use purse seines and lampera nets to collect fish, which are the same as some of the same methods we have employed. However, their goal is to tag smolt size fish and our goal is to tag blackmouth. There is no overlap in the sizes of fish that Dr. Greene proposes to tag and the fish we will tagging. In addition, Dr. Greene's work focuses only on a part of Whidbey Basin, (Skagit Bay), while our study focuses on all of Whidbey Basin.

K. Transportation and Holding

Fish will not be transported live in the course of this project. Fish will be temporarily held live at the point of capture and then released from this point.

L. Cooperative Breeding Program

We are willing to participate in a cooperative breeding program and to maintain or contribute data to a breeding program, if such action is requested.

M. Previous or Concurrent Activities Involving Listed Species

The principal investigator (Kurt Fresh) has not held ESA permits to take listed fish in the past, but has been handling fish in association with fisheries research for 30 years (see attached CV). He has recently applied for a ESA permit for work specifically related to the Snohomish River Estuary.

N. Certification

"I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand this information is submitted for the purpose of obtaining a permit under the Endangered Species Act of 1973 (ESA) and regulations promulgated thereunder, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or to penalties under the ESA."

Signature _____ Date 7/21/06

John W. Ferguson
Director, Fish Ecology Division

O. Length of Time and Cost to Prepare Application

Length of time in hours (all contributing staff): 100
Estimate of Cost: $4,500

N. References

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Table 1. Estimated annual take and mortality from 2007 to 2011 for listed Puget Sound juvenile Chinook salmon collected in Whidbey Basin, Puget Sound, Washington. The hatchery category "ad-clipped" includes fish both with and without CWTs. Note that the research period is intended to encompass sampling in the entire area of study; thus, the actual research period may be shorter depending on specific conditions occurring in that year.

ESU/Species	Origin	Life Stage	Take Activity	Requested Number Fish to be Taken	Requested Authorized Unintentional Mortality	Research Location	Research Period
Puget Sound Chinook salmon	Wild	Juvenile	Capture, handle, release	1,398	0	Whidbey Basin	February-October
Puget Sound Chinook salmon	Wild	Juvenile	Capture, mark, tag, tissue sample, release	240	0	Whidbey Basin	February-October
Puget Sound Chinook salmon	Wild	Juvenile	Intentional mortality	748	N/A	Whidbey Basin	February-October
Puget Sound Chinook salmon	Hatchery, ad-clipped	Juvenile	Capture, handle, release	660	0	Whidbey Basin	February-October
Puget Sound Chinook salmon	Hatchery, ad-clipped	Juvenile	Capture, mark, tag, tissue sample, release	130	0	Whidbey Basin	February-October
Puget Sound Chinook salmon	Hatchery, ad-clipped	Juvenile	Intentional mortality	342	N/A	Whidbey Basin	February-October
Puget Sound Chinook salmon	Hatchery, intact adipose + CWT	Juvenile	Capture, handle, release	40	0	Whidbey Basin	February-October
Puget Sound Chinook salmon	Hatchery, intact adipose + CWT	Juvenile	Capture, mark, tag, tissue sample, release	5	0	Whidbey Basin	February-October
Puget Sound Chinook salmon	Hatchery, intact adipose + CWT	Juvenile	Intentional mortality	19	N/A	Whidbey Basin	February-October

Table 2. Estimated annual take and mortality from 2007 to 2011 for listed Puget Sound juvenile Chinook salmon collected in Admiralty Inlet, Puget Sound, Washington. The hatchery category "ad-clipped" includes fish both with and without CWTs. Note that the research period is intended to encompass sampling in the entire area of study; thus, the actual research period may be shorter depending on specific conditions occurring in that year.

ESU/Species	Origin	Life Stage	Take Activity	Requested Number Fish to be Taken	Requested Authorized Unintentional Mortality	Research Location	Research Period
Puget Sound Chinook salmon	Wild	Juvenile	Capture, handle, release	188	0	Admiralty Inlet	February-October
Puget Sound Chinook salmon	Wild	Juvenile	Capture, mark, tag, tissue sample, release	240	0	Admiralty Inlet	February-October
Puget Sound Chinook salmon	Wild	Juvenile	Intentional mortality	150	N/A	Admiralty Inlet	February-October
Puget Sound Chinook salmon	Hatchery, ad-clipped	Juvenile	Capture, handle, release	325	0	Admiralty Inlet	February-October
Puget Sound Chinook salmon	Hatchery, ad-clipped	Juvenile	Capture, mark, tag, tissue sample, release	130	0	Admiralty Inlet	February-October
Puget Sound Chinook salmon	Hatchery, ad-clipped	Juvenile	Intentional mortality	95	N/A	Admiralty Inlet	February-October
Puget Sound Chinook salmon	Hatchery, intact adipose + CWT	Juvenile	Capture, handle, release	22	0	Admiralty Inlet	February-October
Puget Sound Chinook salmon	Hatchery, intact adipose + CWT	Juvenile	Capture, mark, tag, tissue sample, release	5	0	Admiralty Inlet	February-October
Puget Sound Chinook salmon	Hatchery, intact adipose + CWT	Juvenile	Intentional mortality	5	N/A	Admiralty Inlet	February-October

Table 3. Estimated annual take and mortality from 2007 to 2011 for listed Puget Sound juvenile Chinook salmon collected in the San Juan Islands, Puget Sound, Washington. The hatchery category "ad-clipped" includes fish both with and without CWTs. Note that the research period is intended to encompass sampling in the entire area of study; thus, the actual research period may be shorter depending on specific conditions occurring in that year.

ESU/Species	Origin	Life Stage	Take Activity	Requested Number Fish to be Taken	Requested Authorized Unintentional Mortality	Research Location	Research Period
Puget Sound Chinook salmon	Wild	Juvenile	Capture, handle, release	188	0	San Juan Islands	February-October
Puget Sound Chinook salmon	Wild	Juvenile	Capture, mark, tag, tissue sample, release	240	0	San Juan Islands	February-October
Puget Sound Chinook salmon	wild	Juvenile	Intentional mortality	150	N/A	San Juan Islands	February-September
Puget Sound Chinook salmon	Hatchery, ad-clipped	Juvenile	Capture, handle, release	325	0	San Juan Islands	February-October
Puget Sound Chinook salmon	Hatchery, ad-clipped	Juvenile	Capture, mark, tag, tissue sample, release	130	0	San Juan Islands	February-October
Puget Sound Chinook salmon	Hatchery, ad-clipped	Juvenile	Intentional mortality	95	N/A	San Juan Islands	February-October
Puget Sound Chinook salmon	Hatchery, intact adipose + CWT	Juvenile	Capture, handle, release	22	0	San Juan Islands	February-October
Puget Sound Chinook salmon	Hatchery, intact adipose + CWT	Juvenile	Capture, mark, tag, tissue sample, release	5	0	San Juan Islands	February-October
Puget Sound Chinook salmon	Hatchery, intact adipose + CWT	Juvenile	Intentional mortality	5	N/A	San Juan Islands	February-October

Table 4. Estimated annual take and mortality from 2007 to 2011 for listed Puget Sound juvenile Chinook salmon collected in the Strait of Juan de Fuca, Puget Sound, Washington. The hatchery category "ad-clipped" includes fish both with and without CWTs. Note that the research period is intended to encompass sampling in the entire area of study; thus, within each region sampled, the actual research period may be shorter depending on conditions occurring in that year.

ESU/Species	Origin	Life Stage	Take Activity	Requested Number Fish to be Taken	Requested Authorized Unintentional Mortality	Research Location	Research Period
Puget Sound Chinook salmon	Wild	Juvenile	Capture, handle, release	188	0	S. Juan de Fuca	February-October
Puget Sound Chinook salmon	Wild	Juvenile	Capture, mark, tag, tissue sample, release	240	0	S. Juan de Fuca	February-October
Puget Sound Chinook salmon	Wild	Juvenile	Intentional mortality	150	N/A	S. Juan de Fuca	February-October
Puget Sound Chinook salmon	Hatchery, ad-clipped	Juvenile	Capture, handle, release	325	0	S. Juan de Fuca	February-October
Puget Sound Chinook salmon	Hatchery, ad-clipped	Juvenile	Capture, mark, tag, tissue sample, release	130	0	S. Juan de Fuca	February-October
Puget Sound Chinook salmon	Hatchery, ad-clipped	Juvenile	Intentional mortality	95	N/A	S. Juan de Fuca	February-October
Puget Sound Chinook salmon	Hatchery, intact adipose + CWT	Juvenile	Capture, handle, release	22	0	S. Juan de Fuca	February-October
Puget Sound Chinook salmon	Hatchery, intact adipose + CWT	Juvenile	Capture, mark, tag, tissue sample, release	5	0	S. Juan de Fuca	February-October
Puget Sound Chinook salmon	Hatchery, intact adipose + CWT	Juvenile	Intentional mortality	5	N/A	S. Juan de Fuca	February-October

Table 5. Estimated cumulative annual take and mortality for listed Puget Sound Pacific salmon Whidbey Basin and Northern Puget Sound (i.e., all areas detailed in previous tables combined). The hatchery category "ad-clipped" includes fish both with and without CWT. The research period is intended to encompass sampling in the entire area of study.

ESU/Species	Origin	Life Stage	Take Activity	Requested Number Fish to be Taken	Requested Authorized Unintentional Mortality	Research Location	Research Period
Puget Sound Chinook salmon	Wild	Juvenile	Capture, handle, release	1,962	0	Puget Sound	February-October
Puget Sound Chinook salmon	Wild	Juvenile	Capture, mark, tag, tissue sample, release	960	0	Puget Sound	February-October
Puget Sound Chinook salmon	Wild	Juvenile	Intentional mortality	1,198	N/A	Puget Sound	February-October
Puget Sound Chinook salmon	Hatchery, ad-clipped	Juvenile	Capture, handle, release	1,635	0	Puget Sound	February-October
Puget Sound Chinook salmon	Hatchery, ad-clipped	Juvenile	Capture, mark, tag, tissue sample, release	520	0	Puget Sound	February-October
Puget Sound Chinook salmon	Hatchery, ad-clipped	Juvenile	Intentional mortality	627	N/A	Puget Sound	February-October
Puget Sound Chinook salmon	Hatchery, intact adipose + CWT	Juvenile	Capture, handle, release	106	0	Puget Sound	February-October
Puget Sound Chinook salmon	Hatchery, intact adipose + CWT	Juvenile	Capture, mark, tag, tissue sample, release	20	0	Puget Sound	February-October
Puget Sound Chinook salmon	Hatchery, intact adipose + CWT	Juvenile	Intentional mortality	34	N/A	Puget Sound	February-October
Puget Sound Chum Salmon	Wild	Juvenile	Capture, handle, release	100	0	Puget Sound	February-October
Puget Sound Chum Salmon	Wild	Juvenile	Capture, mark, tag, tissue sample, release	0	0	Puget Sound	February-October
Puget Sound Chum Salmon	Wild	Juvenile	Intentional mortality	0	N/A	Puget Sound	February-October
Puget Sound Chum Salmon	Hatchery	Juvenile	Capture, handle, release	50	0	Puget Sound	February-October
Puget Sound Chum Salmon	Hatchery	Juvenile	Capture, mark, tag, tissue sample, release	0	0	Puget Sound	February-October
Puget Sound Chum Salmon	Hatchery	Juvenile	Intentional mortality	0	N/A	Puget Sound	February-October